Daily Diary Report by Bid Item

Contract No.: 04-0120F4

Diary #: 089 **Const Calendar Day:** 567 **Date:** 29-Mar-2011 Tuesday

Inspector Name: Iranmanesh, Abbas **Title:** Transportation Engineer

Inspection Type:

Shift Hours: **Break:** **Over Time:**

Federal ID:

Location:

Reviewer: Boal, Brian **Approved Date:** 10-Oct-13 **Status:** Approved

04-0120F4
04-SF-80-13.2/13.9
Self-Anchored
Suspension Bridge

Weather

Temperature **7 AM** **12 PM** **4PM**

Precipitation **Condition**

Working Day ☐ If no, explain:

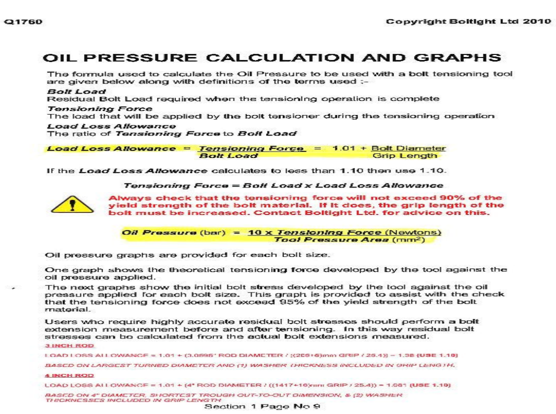
Diary:

Dispute ☐

Work description.

1- ABF had no activity today.
2- The anchor rods of the deviation saddles are steel ASTM Grade BC with Minimum of Ultimate Tensile strength of Fu =739 Mpa. The contract plan specifies the rods shall be pre-tensioned by jacking to 70% of their full ultimate tensile strength. A check has been done on the pre-tensioning value given in the submittal ABF-SUB-1684R01. The attached calculations show that the rods are jacked to 75% of their ultimate strength, which is more conservative due to anchor head losses. The rods are jacked by BLOLTIGHT model TDF-2000-02-00 with a Hydraulic Pressure Area of 8758 mm^2 to a pre-tension fore of 1041 KN, which is equivalent to a gage pressure of 17250 psi. If any other model of BOLTIGHT with higher a Hydraulic Pressure Area is used a smaller gage pressure is required to achieve the pre-tensioning force of 1041 KN. ABF requires to declare the type of jack and calibration certification before any pre-tensioning. It is the right of Caltrans inspectors to verify the gage pressure for each anchor rod.

Attachment



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OIL PRESSURE CALCULATION AND GRAPHS

The formula used to calculate the Oil Pressure to be used with a bolt tensioning tool are given below along with definitions of the terms used :-

Bolt Load
Residual Bolt Load required when the tensioning operation is complete

Tensioning Force
The load that will be applied by the bolt tensioner during the tensioning operation

Load Loss Allowance
The ratio of ***Tensioning Force*** to ***Bolt Load***

Load Loss Allowance = ***Tensioning Force*** / ***Bolt Load*** = 1.01 + Bolt Diameter / Grip Length

If the ***Load Loss Allowance*** calculates to less than 1.10 then use 1.10.

Tensioning Force = Bolt Load x Load Loss Allowance

Always check that the tensioning force will not exceed 90% of the yield strength of the bolt material. If it does, the grip length of the bolt must be increased. Contact Boltight Ltd. for advice on this.

Oil Pressure (bar) = 10 x ***Tensioning Force*** (Newtons) / ***Tool Pressure Area*** (mm^2)

Oil pressure graphs are provided for each bolt size.

One graph shows the theoretical tensioning force developed by the tool against the oil pressure applied.

The next graphs show the initial bolt stress developed by the tool against the oil pressure applied for each bolt size. This graph is provided to assist with the check that the tensioning force does not exceed 95% of the yield strength of the bolt material.

Users who require highly accurate residual bolt stresses should perform a bolt extension measurement before and after tensioning. In this way residual bolt stresses can be calculated from the actual bolt extensions measured.

3 INCH ROD

LOAD LOSS ALLOWANCE = 1.01 + (3.0695" ROD DIAMETER / ((205+6)mm GRIP / 25.4)) = 1.38 (USE 1.10)

BASED ON LARGEST TURNED DIAMETER AND (1) WASHER THICKNESS INCLUDED IN GRIP LENGTH.

4 INCH ROD

LOAD LOSS ALLOWANCE = 1.01 + (4" ROD DIAMETER / ((1417+16)mm GRIP / 25.4)) = 1.081 (USE 1.10)

BASED ON 4" DIAMETER, SHORTEST TROUGH OUT-TO-OUT DIMENSION, & (2) WASHER THICKNESSES INCLUDED IN GRIP LENGTH

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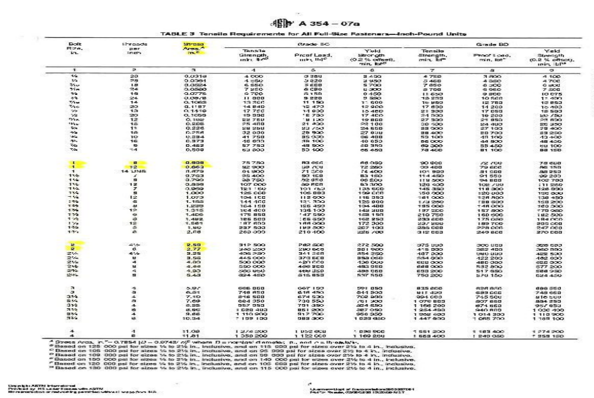

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Job Name: 04-0120F4 **Inspector Name:** Iranmanesh, Abbas **Diary #:** 089 **Date:** 29-Mar-2011 **Tuesday**

Abbas Iranmanesh

$0.7F_u = 0.7(793) = 555.1$ MPa

$A_{SB} = 2.54\ in^2\ (1638.7\ mm^2)$

TDF-2000-02-00
Bolt-Tensioning Tool

Tension Force = Bolt load $(1.01 + \frac{\text{Bolt diameter}}{\text{Stud length}})$

Bolt load = $0.7F_u(A) = (555.1 \times 1638.7 \times 10^{-6}) = 0.9096$ MN
OR 909.6 KN ≈ 916 KN

Tension force = $916(1.01 + \frac{31}{700}) = 916(1.08) \approx 983$ KN

Oil pressure = $\frac{10 \times \text{Tension force (N)}}{\text{Tool pressure Area}}$

Oil pressure = $\frac{10 \times 983 \times 10^3}{8758} = 1122.4$ Bar (16280 PSI)

Check with $0.75F_u = 0.75(793) = 595$ MPa

Bolt load = $0.75F_u(A) = (0.75 \times 793)(1638.7 \times 10^{-6}) = 0.975$ MN
OR 975 KN

Tension Force = $975(1.08) = 1053$ KN

Oil Pressure = $\frac{10 \times 1053 \times 10^3}{8758} = 1202.3$ Bar (17438 PSI ≈ 17440 PSI)

which is close to 16250 psi of the pressure load graph (submittal ABF-SUB-1684-R01).

$\frac{17440}{16280} = 1.06$, ABF has increased the pre-tensioning force about 6% which is more conservative due to load loss.